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Tunable Carbon Nanotube Tunneling Devices for Wireless Communications JAEWU CHOI, Wayne State University, YOUNGSIK SONG, Wayne State University — Carbon nanotube could be one of the best candidates for a nanoscale emitter, a receiver, and a mechanical switch, which are essential components for the future application of high-speed wireless communications. Tunable nanoscale resistors, capacitors, inductors, and mechanical resonators can be implemented with carbon nanotubes. It is originated from the excellent properties of carbon nanotube such as structure dependent metallic properties, pseudo-one-dimensional transport characteristics and electronic structure, hollow structure, extremely high mechanical strength with high aspect ratio, good thermal conductivity, chemical inertness, etc. In this study, we studied carbon nanotubes as an emitter, a receiver and an electromechanical oscillator from suspended carbon nanotubes on a device array for the wireless communications. The suspended carbon nanotube arrays are fabricated by directly and laterally grown carbon nanotubes on the multilayer electrode arrays with a field effect transistor structure. The characteristics of carbon nanotube transmitter, receiver, and mechanical oscillator are studied using an impedance analyzer as a function of frequency and gate voltage modulation.

Jaewu Choi
Wayne State University

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